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ABSTRACT

Eighth-grade students were studied to learn how their interpretations of school situations are influenced by behavior and visual space attributes and settings. A variety of studies support the importance of relationships between the person and the learning environment. In this study, it was hypothesized that students would evaluate as more appropriate those situations with similar levels of privacy opportunity and privacy requirements. The students identified settings in their school that were perceived to afford more opportunity for privacy as well as selected behaviors that required more privacy to perform. A four-coordinate grid was then constructed that identified locations affording theoretically high or low levels of privacy in each setting. Finally, the students completed a questionnaire in which they evaluated the appropriateness of performing various behaviors in each setting. The data thus collected indicate that students' appropriateness evaluations are a function of (1) perceived privacy required for or social norms associated with student behavior; (2) potential exposure to visual monitoring of one's behavior by others; and (3) unique visual space-behavior situations produced by settings associated with strong social norms and whose functional elements relate directly to specific behavior. The students' evaluations suggest that visual space attributes and the physical environment are potent variables along with behavior in students' perceptions of their school experiences. Twenty-two references are appended. (GJ)

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Effects of School Settings, Visual Space, and Behavior on Evaluations of Appropriateness

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Abstract

Eighth grade students (N = 48) evaluated the appropriateness of simulated setting-spatial attribute-behavior school situations. The situations differed in the levels of perceived privacy opportunity afforded and privacy required for behavior performance. Results of the analysis of variance yielded significant effects of school settings, visual space attributes, behavior, and their interactions on students' evaluations. The findings indicated that students' evaluations are a function of: (a) perceived privacy required for and social norms associated with student behavior, (b) potential high exposure to others' ability to monitor visually one's behavior, and (c) unique visual attribute-behavior situations produced by restroom settings associated with strong social norms and whose functional elements relate directly to specific behaviors.

Effects of School Settings, Visual Space, and Behavior on Evaluations of Appropriateness

A variety of studies support the importance of person-learning environment relationships (PER). Despite concerted efforts by a number of investigators addressing a broad range of issues, we lack a systematic understanding of the impact of the physical learning environment on and its interaction with students' and teachers' behavior and attitudes. This situation may be attributed to a lack of PER theories which treat the environment in explicit terms and precise measurement techniques which tap the socio-spatial nature of the environment.

Major physical learning environment studies have defined schools as big or small according to their student population (Barker, 1968), open space or traditional design based on the presence or absence of load-bearing walls and partitions (Coleman, 1973), or by seating position, density, classroom design; noise, thermal, and lighting conditions, and windows (Weinstein, 1979). A more recent study related measures of perimeter space, permanent walls, furniture density, and space footage per person to a

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I am grateful to Shirley Reed, Norm Lamprey, Kathy Hand, and Dick Whitner and the eighth grade students at Highlands Middle School, Kennewick, Washington, for allowing me to conduct this study in their school.

a variety of criterion measures across educational settings (Ahrentzen, 1981). Theoretical developments in the field of architecture go one step further by providing explicit models that describe the socio-spatial environment. This study uses the visual access and exposure model and its methodology (Archea, 1984) to define environmental attributes in a study exploring the impact of environment and behavior on students' evaluations of privacy-related situations.

In contrast to previous studies in which privacy was defined as chosen physical aloneness (Moffitt, 1974; Weinstein, 1982), privacy was defined as a state of being or context in which people manage information and regulate social interaction toward a restriction of social transaction (Altman, 1975; Margulis, 1977; Westin, 1967). Further, individuals and groups attain privacy through a continual process of environmental and behavioral adjustments. The inclusion of information management coincides with results of children's and adolescents' interviews which identified information management along with aloneness as a dominant element in privacy definitions (Wolfe, 1978). While opportunities for privacy as physical aloneness may be minimal in ordinary classrooms (Weinstein, 1979), opportunities for privacy as information management exist throughout school facilities.

Students' awareness of privacy opportunities is recorded in anecdotal reports and empirical data which demonstrate students' desire for privacy, their dissatisfaction with a perceived lack of privacy opportunity (Mack, 1976; Rivlin & Rothenburg, 1975) and their ability, by the age of 2-5 years, to use environment and behavior to attain privacy in school when allowed to do so (Jacobs, 1977). Although students report a desire for privacy, research on students' use of "privacy booths" or carrells shows little continued use of those elements in classroom situations (Moffitt, 1974; Weinstein, 1982).

The minimal use may be explained by the booths' restriction of potential social interaction, restriction of access to surrounding events, and exposure to others' view. Indeed, the appeal of private spaces appears to be related to opportunities to observe others (Curtis & Smith, 1974; Weinstein, 1982). Brunetti (1972) reasoned that students reported more opportunities for privacy in open space schools than in conventional design schools because they may have greater freedom to position themselves in space to match their objectives. These studies suggest that students are sensitive to subtle underlying attributes of the environment and enter them into their interpretations or evaluations of school situations.

Access and Exposure Model

The visual access and visual exposure model (Archea, 1974, 1984) provides a framework for analyzing person-environment relationships based on the concept of fields of information. Archea's (1984) central premise states that "the arrangement of the physical environment regulates the distribution of information upon which all interpersonal behavior depends" (p. 34). Two key attributes, visual access and visual exposure, were selected to define the environment. Visual access is the potential opportunity to monitor visually others' behavior (Figure 1). It affects the awareness of behavioral opportunities and, therefore, the ability to coordinate behavior with others. Conversely, the potential opportunity for others' to monitor one's behavior defines visual exposure (Figure 1). Increased visual exposure limits theoretically behavioral options and raises personal accountability. Differences in access and exposure levels establish the predominance of awareness or accountability for given locations.

Insert Figure 1 about here

An extensive field study provides initial validation of Archea's model and its propositions (1984). Results of the observation and mapping study conducted in the Philadelphia

Geriatric Center (PGC) showed that theoretical levels of access and exposure correlated significantly to the respective number of people the residents could see or be seen by and demonstrated their sensitivity to access and exposure by their over- and under-representation at specific locations and settings favoring low exposure locations. Further, the PGC findings identified direct relationships between residents' behavior and levels of access and exposure created by purely architectural factors.

Patterns of behavior and social norms also define learning spaces. Extensive behavioral observation studies have established behavior-setting identities (Barker, 1968; Barker & Wright, 1955). Students' expectations of the privacy afforded by a variety of school settings defined an additional environmental variable influencing students'interpretations of school situations.

Previous studies also indicate that young adolescents have a fairly complex understanding of privacy (Wolfe, 1978) and the ability to seek and find privacy for a variety of behaviors (Parke & Sawin, 1975). Middle school students' assessments of the privacy requirements of a variety of school behaviors defined the behavioral variable (Shumaker, 1979). In accordance with the interactionist perspective, the environment and behavior variables were combined to form setting-attribute-behavior situations.

These situations were developed from the levels of theoretical privacy opportunity created by visual attributes, levels of assessed privacy afforded by a few school settings, and the levels of perceived privacy required to perform a limited number of behaviors. It was hypothesized that students would evaluate as more appropriate those situations with similar levels of privacy opportunity and privacy requirements than situations with dissimilar levels of locational privacy opportunity and behavioral privacy requirements.

Method

Subjects

Eighth grade students (N = 48) attending a single middle school, 6-7-8, participated in the study. The 24 girls and 24 boys were selected from a pool of approximately 200 eighth graders using stratified random sampling. The middle school attended by these students serves a primarily white middle-class population.

Materials

The study required a series of materials: a three-dimensional scale model, the visual space attribute values for interior locations, the rankings of setting and behavior on perceived privacy afforded and required, and the setting-spatial attribute-behavior appropriateness questionnaire.

Model. Data from a preliminary study in conjunction with measurements of the actual middle school provided information required for model development. Five settings were selected for modeling based on the results of a preliminary study conducted the previous year with eighth grade students (N = 33) from two intact classes in the same middle school. Analysis of the data, from students' selections of the settings perceived to afford more opportunity for privacy, yielded rankings of generic school settings on an opportunity for privacy dimension. The library and restrooms represented high privacy opportunity settings; the cafeteria and hallways simulated low opportunity settings. In addition, a classroom was selected to function as a sample setting due its medial ranking and its importance to creating a realistic school model (Figure 2).

Insert Figure 2 about here

Data from photographs, measurements of the actual school settings, and blueprints of the school provided the criteria for model construction. The model was built to a scale of three-sixteenths of an inch representing one foot. The model measured approximately three feet by three feet by four inches.

Behavior. In addition to identifying differences in perceived privacy afforded by school settings, the preliminary task asked students to select behaviors which required more privacy to perform. Preliminary study rankings indicated that students' perceived "Crying when you're feeling unhappy" and "Discussing a personal problem with a friend" as high privacy-requiring behavior and "Just being yourself; not trying to be what others want you to be" and "Brushing or combing your hair" as low privacy-requiring behaviors.

Spatial analysis. Analysis of the interior space of the model produced access and exposure values leading to the identification of four coordinate grid locations affording theoretically either high or low levels of privacy in each setting. The visual attribute values were calculated using a directed sector technique which is an estimation of the full iterated sector technique described by Archea (1984). Visual access was measured by counting the coordinate points subtended when a 150 degree angle is directed from a point of origin toward the maximum number of points visible from that location. This angle corresponds to the combined temporal fields of vision, 74 degrees for a fixed head, maximum eye deviation position (Woodson, 1981). Summing the number of points that could be connected to

the origin by an unobstructed linear vector yielded visual exposure values (Figure 1).

These data provided the basis for identifying the high or low levels of an attribute and the high or low levels of privacy opportunity for each coordinate point. In order to determine high or low category membership, each access and exposure value was compared to the respective mean values for each setting. Locations were classified as high or low in privacy opportunity according to their access/exposure ratios across settings: (a) high access/low exposure (HL), 0.977 to 1.000; (b) high access/high exposure, 0.753 to 0.927; (c) low access/low exposure, 0.805 to 0.918; and (d) low access/high exposure, 0.500 to 0.652. These data guided selection of four experimental locations within each setting: two locations providing theoretically high levels of privacy opportunity, HL and HH, and two locations possessing low levels of privacy opportunity, LL and LH. These categories rest on the assumption that high visual access levels allow occupants to regulate social interaction and manage personal information because of the opportunities to predict social phenomena and adjust behavior to them, i.e. they afford a high level of privacy opportunity.

Questionnaire. The questionnaire developed for this study sought students' evaluations of the appropriateness of specific school setting-visual attribute-behavior situations varying according to levels of privacy afforded and required. The four behaviors in combination with four visual space attribute locations and four school settings constituted 64 unique situations. Students evaluated the appropriateness of the setting-attribute-behavior situations on a bipolar scale anchored by very inappropriate (1) and very appropriate (7). In order to control for order effects, the questionnaire was developed as 24 orthogonal permutations of the 64 questions. One girl and one boy responded to each form.

Procedure

Prior to responding to the questionnaire, the investigator read an overview of the study and asked participants to identify each of the modeled settings. Incorrect identifications were followed by a detailed discussion of the setting. After reading the complete instructions, students practiced the research activity for a randomly selected location in the sample classroom setting. The participants were then asked to imagine themselves as the representative figure positioned at each location performing the behaviors within each setting. The figure was

oriented toward the maximum visual access for each selected location. During the activity, students' responses to one-half of the location sets were timed to test for experimenter bias. In addition, a series of questions sought students' assessments of the reality of the situations, model, and figure.

All students completed the tasks individually, and with one exception, within one class period in a large storeroom. The storeroom provided a consistent, well-illuminated, and occasionally noisy environment permeated by an acrid odor. Students appeared to be undistracted by the noise or odor. The study was conducted over a three week period in May.

Results

The results indicate that behavior, visual space attributes, specific school settings and their interactions influence students' evaluations of school situations. The data were analyzed by a three-way analysis of variance with repeated measures on all variables: 4 (setting) x 4 (spatial attributes) x 4 (behaviors). Two tests of significance were conducted due to the large number of repeated measures (64), the high number of degrees of freedom, and the level of significance for all variables, $p < .01$. Newman-Keuls range tests were used for post hoc comparisons of significant main effects. The significance

level of main and interaction effects remained largely unchanged after the application of a conservative F test using a maximum reduction in the degrees of freedom (Geisser & Greenhouse, 1958). While the findings did not support the hypothesis, the strong results provide insight into the effects of the physical learning environment and behavior on students' evaluations of the appropriateness of a variety of socio-spatial phenomena.

The main effect for settings reached significance for evaluated appropriateness, F (3, 141) = 50.9, $p < .01$ and explained 12 percent of the variance. The Newman-Keuls analysis showed higher ratings for the restroom than the homogeneous subset of the library, cafeteria, and hallways, F = (3, 141) = 12,73, $p < .01$. The main effect for behavior had a significant impact on evaluated appropriateness, F (3, 141) = 55.0, $p < .01$ accounting for 24.3 percent of the variance. Post hoc testing results, F (3, 141) = 13.74, $p < .01$, indicated that students perceived "Just being yourself" as much more appropriate than the other behaviors and "Discussing a personal problem" to be more appropriate than crying in school. The main effect for visual space attributes exerted a significant influence on evaluated appropriateness, F (3, 141) = 21.9, $p < .01$. This factor represented 4.9 percent of the variance. The range test results, F (3, 141) = 5.48, $p < .01$, showed that students rated appropriateness higher for behaviors

performed at the high access/low exposure (HL) locations than at both the low access/high exposure (LH) and high access/high exposure (HH) locations. Evaluations for the LL attribute locations did not differ significantly from the other attribute locations for the combined settings ratings.

The ANOVA also revealed significant first-order interactions for setting x locational attributes, F (9, 423) = 12.8, $p < .01$, setting x behavior, F (9, 423) = 16.9, $p < .01$, and location x behavior F (9, 423) = 11.7, $p < .01$. The setting x location interactions accounted for 13.3 percent of the variance, the setting x behavior and location x behavior interactions explained respectively, 13 and 5.5 percent of the variance.

The significant setting x attribute x behavior interaction, 14.4 percent of the variance, clarifies the main and first-order interaction effects, F (27, 1269) = 10.6, $p < .01$. The mean scores identified two sets of interactions, restroom setting by location by behavior and cafeteria setting by low access/low exposure location by behavior (Table 1). First, students' responses showed that: (a) LL locations cited in the restrooms within enclosed toilet stalls were perceived as far more

Insert Table 1 about here

appropriate places in which to cry than all of the other locations for all settings and (b) brushing or combing hair was perceived as far more appropriately performed in the nonstall restroom locations than in any location cited in the other settings (Figure 3). Understandably, the mean scores indicate that the students' felt that discussing a personal problem in the stall LL locations created a less appropriate situation than in the other restroom locations.

Insert Figure 3 about here

Second, the mean scores reveal a divergent pattern of evaluated appropriateness between the LL location in the cafeteria and situations involving low access and low exposure attributes in the other settings. Students perceived as less appropriate three of the four behaviors, discussing a personal problem, crying, and just being yourself at the LL location in the cafeteria than in similar locations in the library, restrooms, or hallways. Indeed, the appropriateness evaluations for the LL cafeteria situation resemble more closely evaluations for high exposure locations in the library and hallway settings.

Analysis of participants' responses to the questions designed to assess the reality of the situations supported the ecological validity of the simulation. The majority reported that they could

imagine themselves as the figure in the varied situations, 98 percent, that they would normally perform the selected behaviors, 55 percent, and that the model was a realistic representation of their school setting, 65 percent. All of the students identified the settings correctly. Results of an ANOVA conducted to examine possible experimenter bias comparing response time for locations whose attributes are linked theoretically to privacy with the response time for locations having equivalent access/exposure ratios yielded no significant differences.

Discussion

Results of the exploratory study indicate that behavior, visual space attributes and settings influence jointly students' interpretation of school situations. The major findings indicate that students' appropriateness evaluations are a function of the: (a) perceived privacy required for or social norms associated with student behavior, (b) potential exposure to visual monitoring of one's behavior by others, and (c) unique visual space-behavior situations produced by settings associated with strong social norms and whose functional elements relate directly to specific behavior. The findings produced no evidence, however, to support the proposed direction of the interaction between the key variables.

The behavioral effects showed a consistent pattern for nonrestroom settings. In this pattern, behaviors perceived to require a high level of privacy or associated with strong social norms inhibiting public display, crying or brushing your hair, were evaluated as less appropriately performed than behaviors perceived to require less privacy or associated infrequently with such norms to any particular setting, just being youself and discussing a personal problem with a friend. This pattern occurred regardless of a locations' visual attributes within the library, cafeteria, and hallways. The strength of the behavior effect may also be explained by teachers' explicit reminders to students of behavioral appropriateness. The pattern of behavior and setting effects is inconsistent with the rankings according to perceived privacy requirements or privacy opportunity obtained in the preliminary study. The discrepancies may be interpreted as the difference between evaluations of behavior and setting abstracted from real situations and ratings of those behaviors in the specific simulated setting-location situations. These differences underscore the importance of representing students' school experiences as socio-environmental phenomena, not soley as behavior operating independently of the physical milieu.

The results revealed two patterns of appropriateness for nonrestroom settings in response to visual space attributes: (a)

lower evaluations for locations with a high potential for monitoring by others' and conversely, (b) higher appropriateness for locations which minimize potential visual exposure, particularly those that afford, in addition, greater awareness of surrounding activity. This reflects students' reported preferences for enclosed towers which provide a view of surrounding activities (Curtis & Smith, 1974) and the opportunity to view class activity (Weinstein, 1982). Students interpreted all of the behaviors as more appropriate when performed in locations which restricted others' ability to monitor visually their behavior. The signficant impact of the access/exposure attributes cannot be explained by explicit appropriateness reminders by faculty. Students' sensitivity to attributes of visual space determined by architectural properties seems all the more meaningful since it operates on an implicit level. The low appropriateness rating for the LL location in the cafeteria provides one exception to the pattern of attribute effect for nonrestroom settings. Neither the access and exposure model nor social norms explain these data. Therefore, one may infer that in certain instances, the absolute size of settings moderates the influence of the access/exposure relationship, i.e., resulting in higher appropriateness ratings for even the relatively high

exposure sites in a small setting or low ratings for low exposure locations in very large settings.

The results compromise the original premise that high levels of visual access afford privacy-opportunity which, in turn, provide an appropriate context for performing behavior perceived to require a high degree of privacy. One may infer from the data that the initial reduction in the transmittal of personal information and restriction of social interaction associated with low visual exposure may provide greater privacy opportunity and create more suitable contexts for a variety of behaviors than high visual access. The high ratings produced by the low levels of visual exposure suggest that this locational attribute provides perceived protection and decreases accountability for a variety of behaviors performed by students, a group of people who as a rule yield to authority figures. These findings and suggestions resemble the results of the Philadelphia Geriatric Center study (Archea, 1984) which revealed preferences for low exposure locations by residents, another group in a largely subordinate role. The effect of the visual space attributes on appropriateness ratings supports propositions of Archea's model relating access and exposure with behavior.

The patterns of behavior and visual space attribute effects remained constant across settings with one exception, the

restroom. The deviation in students' evaluations for the restroom situations may reflect the strong social norms which prescribe the appropriateness of behavior in public and private bathrooms. These norms along with practical considerations appear to take precendence over the social opportunities and obligations created by the physical environment. For example, crying when you're unhappy, rated the least appropriate behavior in three settings, was rated far more appropriate in the low exposure location cited behind a lockable toilet stall door. Similarly, even these young adolescents who seem to comb their hair constantly throughout school space, assessed the personal grooming behavior, brushing your hair, as far more appropriate in restroom settings within view of the mirror than in any other setting. In order to gain a clearer understanding of students' interpretations of privacy-related situations, perceptions of the privacy associated with a variety of behavior, settings, and locational visual attributes need to be defined more precisely.

In sum, these young adolescents' evaluations of situation appropriateness suggest that visual space attributes, in particular, and the physical environment, in general, are potent variables along with behavior in students' perceptions of their school experiences. While additional study is needed to explore further the nature of the relationship between spatial attributes

of the environment and students' social and academic lives in school, the results of this study support the usefulness to educational research of the access and exposure model and its occupanying technique for measuring precisely the physical learning environment.

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Table 1

Mean Scores forSetting by Location by Behavior

Setting	Location: Access/ Exposure	Behavior: Crying	Discussing	Being self	Brushing
Library	HL	2.813	4.208	5.229	3.292
	HH	2.188	3.553	5.333	2.688
	LL	2.250	4.021	5.479	2.646
	LH	1.688	3.000	4.896	2.292
Restroom	HL	3.813	4.271	5.313	5.208
	HH	3.813	4.229	5.417	6.042
	LL	5.521	3.854	5.957	3.438
	LH	3.979	4.833	5.479	6.167
Cafeteria	HL	2.197	4.625	5.479	3.417
	HH	1.833	2.604	4.792	2.417
	LL	1.729	2.979	4.833	2.396
	LH	1.833	3.292	4.750	2.313
Hallway	HL	2.854	4.229	5.521	3.854
	HH	1.896	2.938	4.917	2.958
	LL	3.167	4.354	5.625	3.875
	LH	1.958	2.688	4.833	2.625

Note: Higher scores represent greater appropriateness

Figure Captions

Figure 1. Scale model.

Figure 2. Visual access and exposure for a HH restroom location

Figure 3. Evaluated appropriateness as a function of restroom setting, spatial attributes, and behavior.

School space

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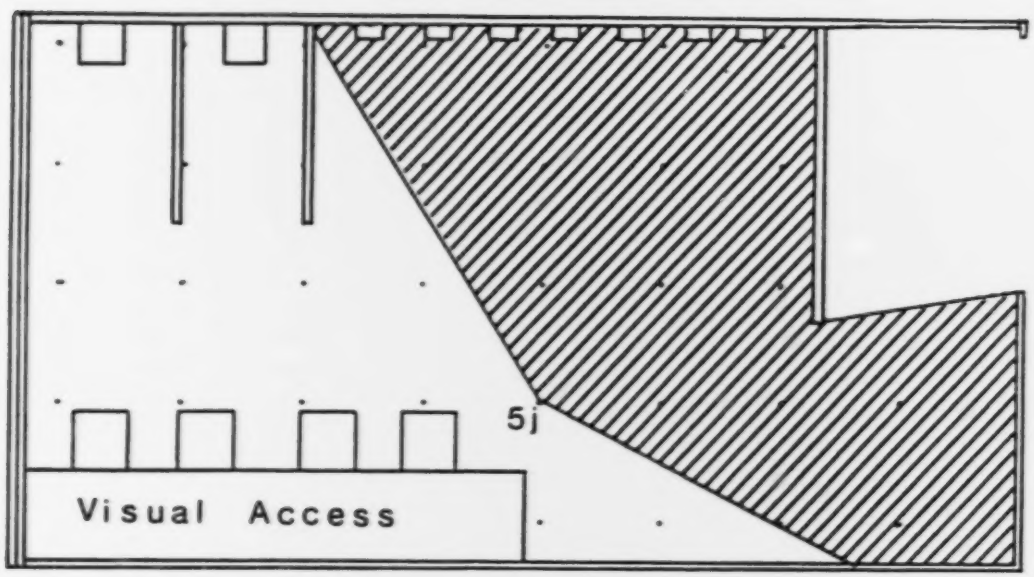
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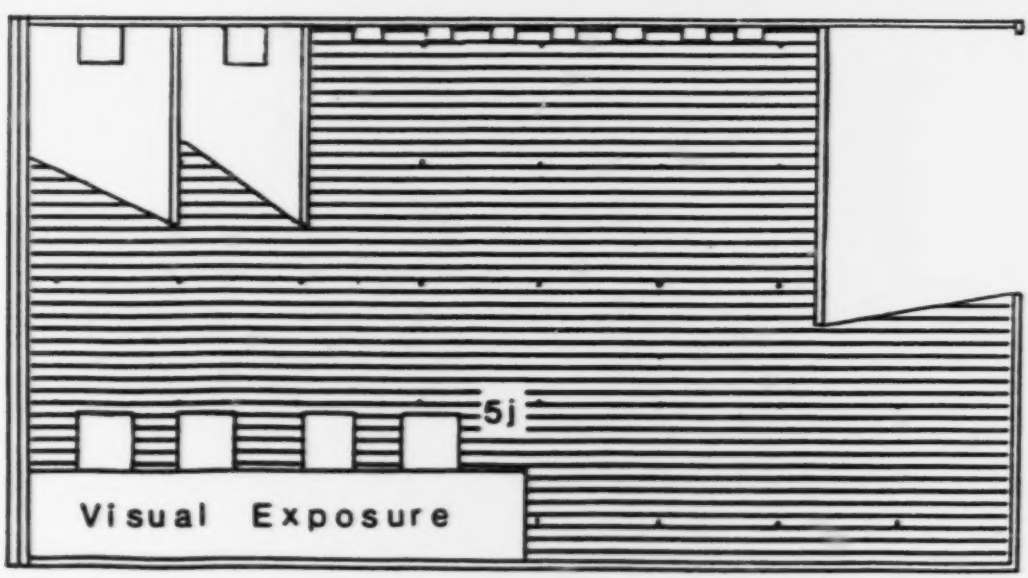
Visual Access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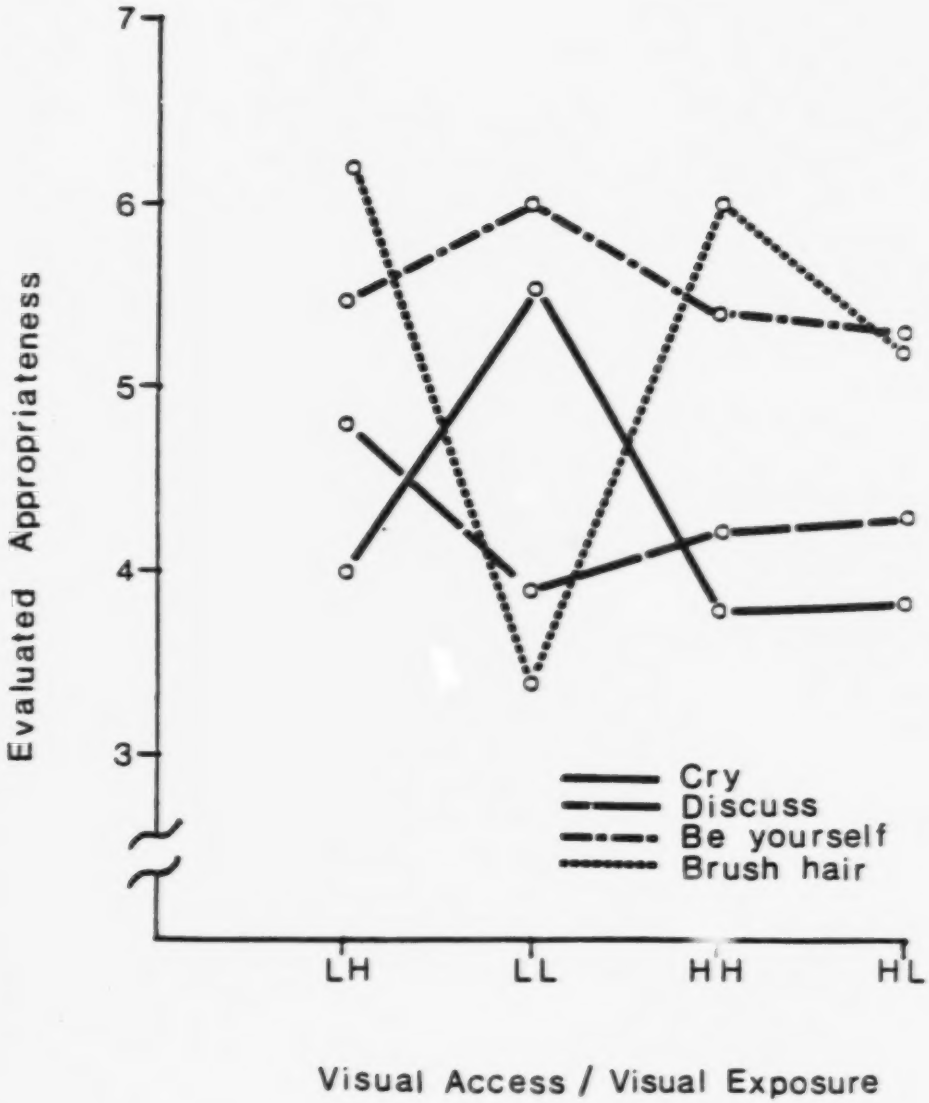
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Evaluated Appropriateness
Cry
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Be yourself
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